Opportunities and Constraints to Using Woody Biomass for Energy

Realizing the potential in Minnesota

NextGen Energy Technical Advisory Workshop and Input Session on Bioenergy

Minnesota Department of Commerce

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- Opportunities for improved forest mgmt
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- Realizing the potential – What is needed

Potential demand for biomass

Energy Facility	Location	tons/yr biomass
Rock Tenn	Saint Paul, MN	394,200
Laurentian Energy Authority	Virginia, MN	250,000
Minnesota Power	Grand Rapids, MN	300,000
FibroMin (Ag residue and wood)	Benson, MN	120,000
District Energy	Saint Paul, MN	300,000
Little Falls Ethanol Cooperative	Little Falls, MN	109,500
Rahr Malting	Shakopee, MN	175,000
Total (potential for biomass)		**1,648,700**

Opportunities to:

- Produce dedicated woody biomass crops
- Improve forest management
  - Previously pre-commercial operations may be used for bioenergy – lowering costs, breaking even or generating a profit
- Increase the value of timber sales through the sale of slash materials
- Manage brushland areas for wildlife habitat and biomass production.

Dedicated energy crops

- Hybrid poplar or willow
- 3-6 year rotation
- Economics improving but still marginal
- Payments for environmental services could improve economics (CO2, water)

Photo: Forest Research

Self-propelled forage harvester (Claas)

Thinning

- Due to costs of pre-commercial thinnings, thinning does not take place
- Thinning has the potential to increase productivity of stands 50% or more
- Thinning could provide important source of biomass and productivity enhancement
- Est. 4.5 dry tons/acre at age 10 and 23.5 at age 30 aspen (Demchik, 2006)

Logging Residue

- 10-19 Green tons/acre depending upon cover type (est. $15-25/ton at plant)
- Would probably have to leave up to 30% on site

Source: Minnesota Logged Area Residue Analysis – MN DNR, 2006

Integrated, intensive forest management

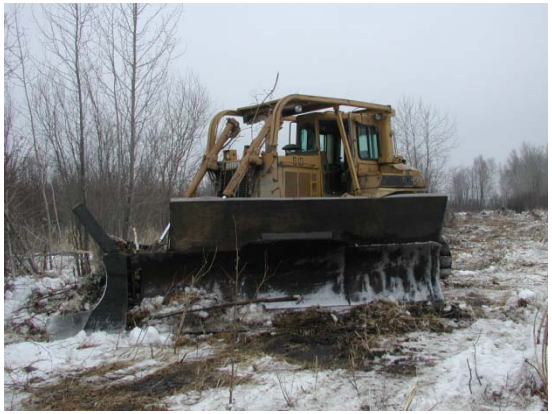
- Include biomass generation throughout management cycle
  - Optimize biomass and forest product production
  - Healthier, more resistant forest
  - Improved forest productivity for a number of benefits
  - Under guidelines that ensure environmental services
  - Increased employment opportunities

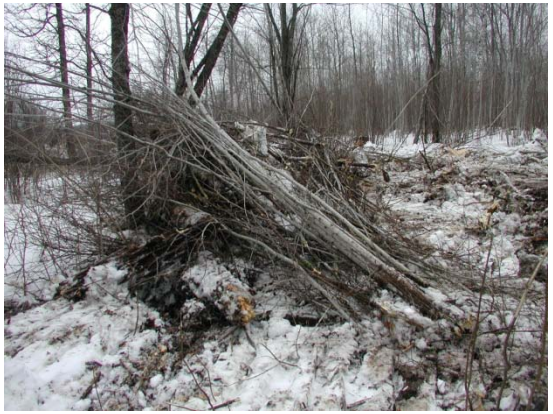
Hazardous fuel removal

- Forest Service pays up to $575/acre currently for hazardous fuel removal
- 14,000 acres on the Superior National Forest in 2007
- 7-10 green tons/acre
- By harvesting hazardous fuel for biomass energy use, costs of treatment could be reduced
- Little work has been done on this

Brushland harvest

- Brush currently sheared, piled and often burned for wildlife habitat management
- Brush could be harvested and sold
- Density of brush important to economics
- Estimated 12-17 dry tons/acre on well stocked sites (Berguson, 1997)





Environmental concerns

- Over harvest of forest lands
- Depletion of nutrients when removing greater amount of material
- Brushland and slash harvest principles
  - Research background provided by UMN
  - Guidelines prepared by DNR and MN Forest Resources Council

Environmental benefits

- Healthier, more productive forest
- More resilient ecosystems
- Carbon credits - Minnesota Terrestrial Carbon Project
  - Rules and inst. structure for CO2 trading
  - Trading has started on the Chicago Climate Exchange
  - Carbon credits available for tree plantings

Some current activities

- Estimation of logging slash
  - Logged Area Residue Analysis (DNR)
  - GIS program to predict availability
  - Training for loggers, landowners, nat. res. professionals and businesses
- Estimation of costs and benefits of hazardous fuel removal for biomass
- Pyrolysis work - densification

Issues:

- Many of the biomass related activities are new to land managers
- Production issues
  - How much biomass is available from forests from thinnings and harvest residue
  - How can we economically harvest and transport biomass as an energy source
  - What kind of productivity improvements are possible and what is their value

Issues:

- Logistics:
  - New machinery needs
  - Transportation issues
  - Densification
  - Handling smaller material
- Products
  - Chemicals/Bio-oil
  - Chips
  - Pellets

Issues:

- Ecological services
  - Carbon payments
  - Sustainable management
  - Maintaining forest areas
- Economics
  - Profitability of different options
  - Initial investment needs for new activities
  - Economic/community development

Issues:

- Adoption of new options
  - Incentives
  - Assistance with investment needs
  - Training for new activities
  - Equipment needs

Questions?

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